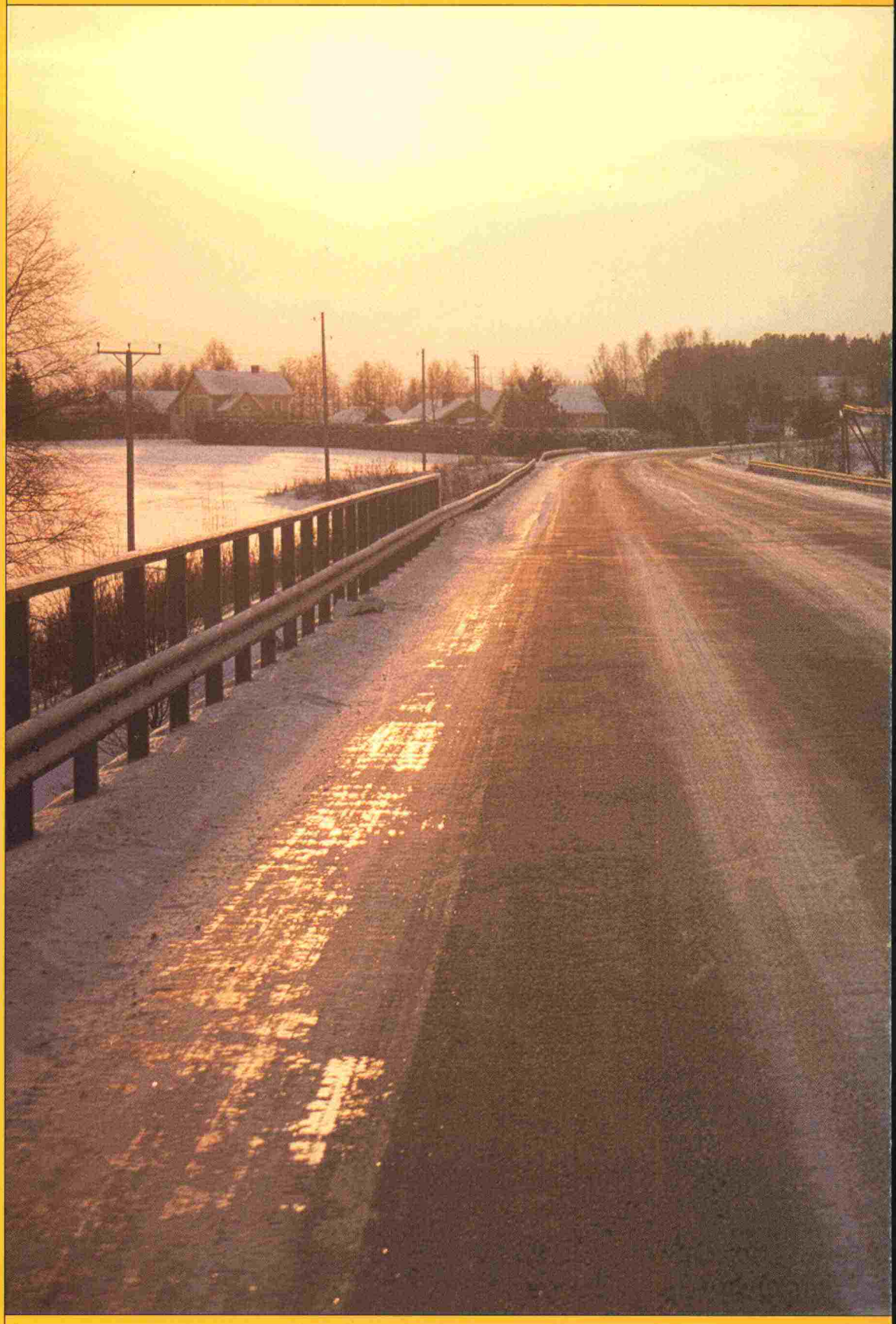
Winter Maintenance Policy in Finland 1996 -



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Finnish National
Road Administration

VANHENTUNUT

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Foreword

The Winter Maintenance Policy describes the principles by which public roads are to be maintained in winter. The policy defines the wintertime level of service of the road network and the quality standards that are necessary to describe it. Because certain factors and volitions that affect the lines of action and quality standards are contradictory, the text also discusses the backgrounds, expectations, effects and special conditions of winter maintenance.

This policy serves as guidelines for the level of service provided to traffic and road users. The definition of the level of service takes into account the numerous effects of operation and the realities of practical implementation. Each production unit will select its own techniques for realizing winter maintenance. They are discussed only to the extent that their selection noticeably affects traffic or the environment. Methods of realization are examined in more detail in the Winter Maintenance Methods Manual.

This manual has been approved by Finnra's board of directors and it will be taken into experimental use in the winter of 1995-96. This manual has been compiled by the following work group: Olli Penttinen (Strategic Planning) chairman, Rauno Kuusela (Construction and Maintenance), Anne Leppänen (Traffic Service Center), Väinö Luttinen (Oulu Region), Juhani Martimo (Vaasa Region), Erkki Nevala (Uusimaa Region), Pauli Pihlaja (Kymi Region), Kalevi Ryynänen (Savo-Karjala Region), Vilho Tenhunen (Keski-Suomi Region) and Saara Toivonen (Strategic Planning).

Strategic Planning

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1 INTRODUCTION

Winter affects the functioning of the entire road network during 5 - 7 months of the year. Winter (November - March) traffic performance accounts for about 35 % of the yearly traffic volume. Winter maintenance allows traffic to function adequately in normal winter conditions and changing weather conditions. The level of service on the public road network follows the same principles throughout the country. However, traffic conditions in different parts of the country vary due to differences in climate.

The Winter Maintenance Policy defines the recommended wintertime level of service on different parts of the road network and the principles that have been followed when decisions have been made regarding numerous factors and values. Because a description of the level of service often requires a definition of the quality of winter maintenance, the policy also includes general quality standards. Practical work and especially work that is contracted out will additionally require more detailed definitions of quality and specific instructions based on these policies.

Due to the effects of salt on the environment, this manual also defines the policy that Finnish National Road Administration (Finnra) will adhere to in order to reduce the impact of winter maintenance activity on groundwater. To this extent, the policy must be compatible with environmental objectives and policies.

The winter maintenance policies are mainly directed to road management solutions. Because different techniques of realization have a different effect on the level of service, traffic safety and the environment, they are discussed in conjunction with road management alternatives.

The principles and financing level of these policies are based on current road management visions and the Road Management Plan 1995 - 2004.

2 STARTING POINTS

An extensive **"Road Traffic in Winter"** project dealing with winter traffic and maintenance has been completed in June 1995. According to the study, use of the present type of studded tires is socioeconomically worthwhile. Continuation of the current studded tire policy is a basis for this winter maintenance policy. Another important conclusion of the study is that salt usage as a method of skid prevention on main roads is worthwhile on the whole, even though it causes corrosion-related expenses and has a negative impact on groundwater quality. The results of the study indicate that it would be worth increasing the network of salted roads for safety reasons.

The present level of service, which is generally estimated to be high even on an international scale, is the result of long-term, gradual development. The possibility of technically developing this sector, controlling developments in weather conditions and adapting the quality level to local conditions have improved service from the point of view of road users. Operational readiness, which is important from the standpoint of safety, has been improved in the recent years. Further improvement of safety and elimination of sudden, dangerous changes in road conditions are still the most cost-efficient traffic safety measures.

Although the relatively high riskiness of winter road conditions is known and it is a basis for operation, the behavior of the motorists themselves has the greatest effect on traffic safety. Road management activities alone will not suffice to attain the desired safety goals. Better road conditions easily entice drivers to drive faster, negating the improvement in safety that the maintenance activity would have brought about. Motorists must be made to realize the risks related to winter conditions and speed. Road users should be familiar with the main principles and goals of winter maintenance. Informing about road conditions and winter maintenance to influence the behavior of road users is included in the Winter Maintenance Policy.

The level of traffic safety in the winter is satisfactory, but its recent development has not been as good as in the summer. However, the degree of seriousness of accidents occurring in the winter has gone down. The relative share of accidents that happened in winter conditions has increased in the recent years.

The wintertime traffic safety situation in 1993:

- 41 % of all accidents resulting in injuries occurred in the winter (36 % in 1988)
- 37 % of all traffic fatalities occurred in the winter (41 % in 1988)
- 75 % of all accidents occurring in the winter resulted in injuries (57 % in 1988).

The impacts of salt usage on groundwater are extensive, although studies show that they do not directly cause problems. Road salting affects water quality in about 170 groundwater areas. Winter maintenance in the long run must be adapted to the tolerance level of the environment. Because of the environmental impact of salt and the wishes of road users, salt usage has been reduced by applying lighter concentrations and noticeably reducing the extent of the so-called salted road network. Due to the changes, policies have been modified to a certain extent nearly every year. The conflict between the effects of salt usage on safety and the environment has not been completely resolved.

These policies do not take a stand on wintertime speed limits, but are based on the continuation of current practice.

3 WHAT IS EXPECTED OF WINTER MAINTENANCE

3.1 Currently valid decisions and policies

According to **§12 of the road statute**, "a public road must be kept free of snow and ice obstructions correspondingly to the needs of motor vehicle traffic". According to the statute, Finnra can leave certain sections of roadway having minimal traffic without winter maintenance. The road statute has little directive influence on the present level of winter maintenance.

The Council of State's decision in principle concerning road safety improvement requires that, by the year 2000, the number of traffic fatalities be reduced to one half of the 1989 level. Finnra's aim is to realize one quarter of the traffic fatality reduction goal by means of its own activity. A traffic safety plan which is an appendix to the decision proposes a reduction in the risks of winter traffic. This means skid prevention and the maintenance level of pedestrian and bicycle paths, in particular. The Ministry of Transport and Communication has expressed its intent to facilitate an increase in bicycling. This means guaranteeing that the most important sections of the pedestrian and bicycle path network have safe and enticing conditions that encourage usage.

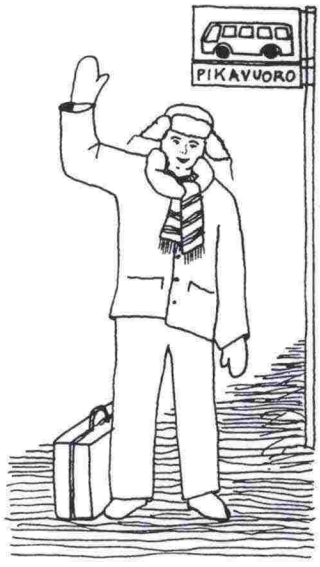
The Ministry of Transport and Communication's plan of action concerning reduction of environmental hazards requires that the harmful effects of salt be reduced 50 % from the 1990 - 92 level by the end of the century. It has been agreed upon in Finnra's environmental goals that 10 % of the most pressing groundwater conservation needs will be taken care of each year. The Ministry of the Environment is preparing groundwater monitoring guidelines which may affect groundwater conservation plans and schedules.

According to **Road Management's Vision 2005**, "the most important goal of road management still will be to guarantee the day-to-day trafficability of the road network. Traffic safety will remain as a central objective. The vision also holds it important to emphasize the responsibility of individual road users. Reliable, fluent and unobstructed mobility is vital to traffic and especially to industry and commerce. The main road network will receive more than average attention and its high level of service will be guaranteed in all road conditions. The demands on and cost of winter maintenance will be increased by a decrease in the use of studded tires and salt."

According to the vision, all aspects of road management will be linked to the basic concept of sustainable development. Sustainable ecological, economical and social solutions will be required of road management. Although environmental work will still be focused on eliminating the

harmful effects of road management and road traffic, operation itself and traffic systems must be developed in a more sustainable direction.

3.2 Expectations of road users



Studies have indicated that road users feel limited salt usage should be a primary objective. They hope that the use of studded tires will continue to be allowed and they do not want lower speed limits in winter. The level of traffic safety could remain at the current level. A secondary alternative would be to preserve the present level of salt usage and improve traffic safety.

Drivers of heavy vehicles are more prone than passenger car drivers to feel the necessity of increasing salt usage in skid prevention. Problematic places such as hills, intersections and bus stops should be well cared for. On the other hand, salt usage in only certain spots reduces the grip of tires when re-entering unsalted surfaces, so salt usage should be consistent on a given section of roadway. Regular bus traffic requires a good level of service to keep the buses on schedule.

4 IMPACTS AND SPECIAL CONDITIONS OF WINTER MAINTENANCE

The main goals and areas of impact of winter maintenance are traffic safety and fluency. At the present level of service, changes will mainly affect safety. The role of fluency and vehicle expenses are relatively small in comparison. From the point of view of heavy traffic, reliable deliveries are a more important factor than driving time. However, the logistic effect of winter maintenance is still of minor importance.

The most noticeable harmful effects of maintenance activity are the effect of salt usage on groundwater, motor vehicle corrosion and dust and motor vehicle damage caused by sanding. Exploitation of gravel reserves for sanding purposes also indirectly causes changes in the landscape and consumes soil layers that protect groundwater reserves. The overall effects and their relative impacts have been assessed in the "Road Traffic in Winter" project.

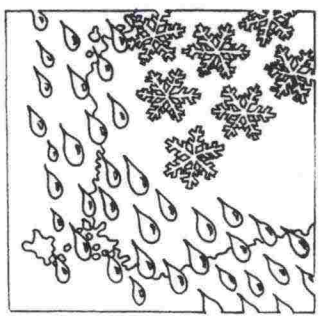
Studies indicate that salt usage is worthwhile, even when corrosion-related expenses and groundwater protection are taken into account. Replacing salting with sanding has even greater negative effects than thought earlier. Pricing the different effects doesn't have much of an effect on overall economic estimates.

Maintenance over a long period must be based on the principle of sustainable development. The use of salt to prevent skidding depends on how well

increases in saltiness can be controlled, especially in groundwater areas. At the moment, there are no chemical alternatives to sodium chloride, the salt that is presently used, that are less harmful to groundwater. Substances that dissolve in water can easily penetrate porous ridge formations and mix with groundwater. Alternative materials probably would cause even greater problems in these conditions.

Winter maintenance is closely related to traffic volume. The road network's traffic accident density (accidents/kilometer of roadway) increases quite proportionally to a rise in traffic volume. Higher speed limits add to the number of accidents and increase the severity of accidents, so traffic that moves faster requires better driving conditions. The traffic-related effects of road maintenance, and especially the time required to implement it, are the greatest on the busiest sections of the road network.

Traffic contributes the effects of salt and sand when attempting to obtain bare roadsurface. Salt usage requires a certain minimum amount of traffic in order to be efficient and to allow the surface of the road to dry before it freezes again. This is especially so in cases where the road should be kept bare after a snowfall. On the other hand, it is difficult to maintain a sufficiently good snow and ice surface when studded tires wear ruts into the compacted snow and traffic makes the compacted surface slippery.



Operational possibilities in winter maintenance are different in different parts of the country due to differences in climate. Weather conditions have also influenced the habits and expectations of road users. Along the coast, where periods of mild temperature are longer, it is more worthwhile to keep the roads bare than in inland areas. Traffic volume has to be greater before inland roads are kept bare. On the other hand, mild temperatures make it more difficult to maintain winter-level traction on roads with compacted snow. The problem caused by snowfall is greater on roads that are to be kept bare because it causes a relatively greater change in driving conditions than on roads with compacted snow.

It is important from the point of view of road users that driving conditions are as consistent as possible with few surprising situations, and that they correspond as logically as possible to traffic needs. Road users are expected to realize that the conditions do not correspond to summertime road conditions.

5 OBJECTIVES AND POLICIES

The main goal of winter maintenance is to guarantee winter traffic conditions that are sufficiently good, safe and consistent to allow society to function efficiently. However, the level of winter maintenance is affected by many contradictory pressures and objectives.

The Winter Maintenance Policy and the included objectives set for the level of service are based on the following main key areas and related policies:

- undisturbed traffic fluency
- a consistent level of service throughout the country on the main road network
- a level of service that corresponds to local conditions and traffic needs
- traffic safety
- the environmental impact of operation
- safeguarding and enhancing pedestrian and bicycle paths
- optimal cost efficiency of operation on the busy roadways
- responsibility in traffic, motorists' behavior, road user information.

In practice, certain key areas and their related objectives are somewhat contradictory. Selection of a policy is based on the results of studies and priorities. Factors that are linked to values are behind many of the main, influential factors of the "Road Traffic in Winter" project.

This winter maintenance policy emphasizes the environment more than do the conclusive calculations of the "Road Traffic in Winter" project, in which the effects on groundwater are priced to reflect costs of conservation. On the other hand, emphasis is placed on traffic safety in relation to the considerably large socioeconomic significance of vehicle corrosion caused by salting.

Undisturbed traffic fluency

The present basic level of traffic fluency in winter is good. The entire road network will be kept in trafficable condition except in exceptionally poor weather conditions. The level of service of each segment of roadway will be defined by adapting national service level goals to local traffic needs. The special needs of heavy traffic, in particular, will also be taken into account.

A consistent level of service throughout the country on the main road network

The level of service of the main road network will be defined in the districts according to uniform principles: the same level of service, which is agreed upon in the districts, will be applied to continuous sections of roadway. Day-to-day maintenance activity will be performed simultaneously to provide uniform driving conditions. The main road network, which is nationally important and carries long distance traffic, will be kept bare throughout most of the country, offering a high level of service.

A level of service that corresponds to local conditions and traffic needs

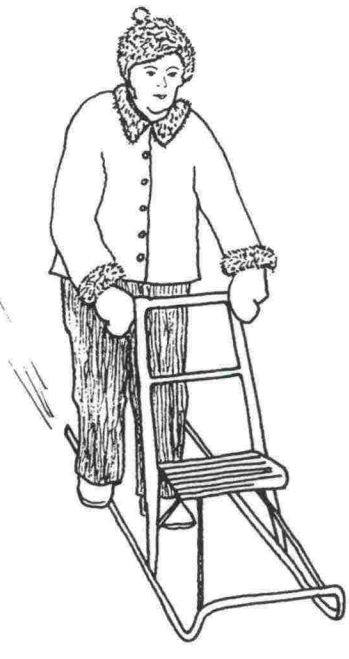
The level of service of winter maintenance of a roadway will be defined mainly according to its functional class and traffic volume. Traffic volume is very important from the standpoint of efficient maintenance activity and traffic safety. The level of service will be planned for each section of roadway, taking into account the local climate, the geometry of the road and the nature and needs of traffic. This includes speed limits, the relative amount of heavy traffic, bus routes, seasonal peaks in traffic volume and integration of the roadway with provincial road and street networks. Temporary special traffic needs also will be flexibly taken care of at the local level. Road users will be informed of abnormal situations and changes in the level of service.

Traffic safety

Traffic safety is the main traffic-related area affected by winter maintenance. Winter maintenance will maintain at least the present safety level. The number of unexpected problem situations occurring on busy main roads will be reduced by adding anticipative maintenance activity.

The environmental impact of operation

Winter maintenance causes environmental hazards. Salting affects groundwater and sanding produces dust and has an indirect impact on the environment due to the use of gravel reserves. Long-term salt usage must correspond to the tolerance level of the environment. This involves studying the salt tolerance of groundwater areas influenced by road salting and adapting the amount of salt used to the tolerance level. If salt usage in a certain area exceeds the long-term tolerance level of that area, protective measures must be taken or traffic safety will have to be ensured by other means (e.g., speed limits).



An attempt to minimize salt usage will be made by studying and developing techniques for skid prevention. Control of environmental hazards will also be guaranteed when activities are contracted out.

Safeguarding and enhancing pedestrian and bicycle paths

Light traffic accidents caused by slipperiness are a noticeable traffic accident category from the standpoint of hospitalization costs. Finnra will contribute to the attempt to reduce the cost of such accidents by increasing skid prevention measures on the busiest light traffic routes.

In order to encourage the use of bicycle and pedestrian paths, and also mass transportation, the basic level of service of winter maintenance must be good

and operation must be implemeted quickly and early enough, especially along routes that serve commuter traffic and people taking care of errands. On sections of roadway where bicyclists and pedestrians must use the shoulder of the road due to a lack of separate light traffic paths, the needs of light traffic must be taken into account in winter maintenance operation. Encouraging bicycle traffic in winter may be contradictory from the point of view of traffic safety, because prevailing conditions, and naturally also the risk level, differ from that of summer, regardless of good maintenance.

Optimal cost efficiency of operation on the busy roadways

From the standpoint of socioeconomic cost efficiency, the busier the road is, the more worthwhile it is to invest in the level of service of the road. Maintenance readiness is a central factor in the efficiency of operation and thereby the ability to influence traffic safety, for example. The cost of anticipative skid prevention measures on the busiest main roads is a small part of the overall cost of operation, but the benefits obtained are great compared to the effort required.

Responsibility in traffic, motorists' behavior, road user information

Traveling in winter conditions means that driving habits always must be modified to suit prevailing weather and road conditions. The level of service is not the same as in summer, regardless of a good level of maintenance. Conditions may change unexpectedly in winter. One aspect of winter maintenance will consist of informing road users of the principles on which winter maintenance activity is based. Information about weather and road conditions will make prevailing and possibly changing travel conditions known so that road users will be aware of the increased safety risk brought about by winter conditions.

6 THE LEVEL OF SERVICE ON THE ROAD NETWORK

6.1 Principles of classification of the level of service

The wintertime level of service of the road network is defined according to the nature and volume of traffic and the local climate. The wintertime level of service on the main roads, which were designed to belong to a higher class, will be kept high and as uniform as possible. The lower limit of traffic volume on roads that are to kept bare (salted) is higher in inland areas, particularly in eastern and northern Finland, than in coastal areas. In these inland areas, the main roads may contain compacted snow, but they still will be well cared for. Wherever the road network is connected to the provincial road network, the level of service will be adapted to it. For example, salt

usage may be limited in areas with low speed limits, even though traffic volume would require the surface to be kept bare.

The road network is divided into five winter maintenance classes (Is, I, Ib, II, III) for the purpose of planning the level of service and implementing maintenance operations. The roads in each class will be maintained according to the quality standards described in more detail below. The road network is divided into classes based on traffic volume and functional class, as shown in figure 1. The traffic volume limits in each class are average values and serve as guidelines. The values can vary about ±20%, depending on climate, for example. Classes Is and I are not used in cold climates (north of the Joensuu - Kuopio - Kemi line).

Factors such as the length of roadway having a given level of service, speed limits, local conditions and traffic needs are taken into account when deciding which class a road should belong in. If the traffic needs of a road should temporarily change (such as temporary use by heavy traffic), the road will be maintained better than required by the standard without changing the classification of the road. Special mention will be made of this in production contracts or it will be mentioned in job-specific work instructions. The purpose will be to uniformly maintain the sections of roadway in such a way that road users will not meet up with unexpected situations. Special attention has to be paid to this near the limits of maintenance regions.

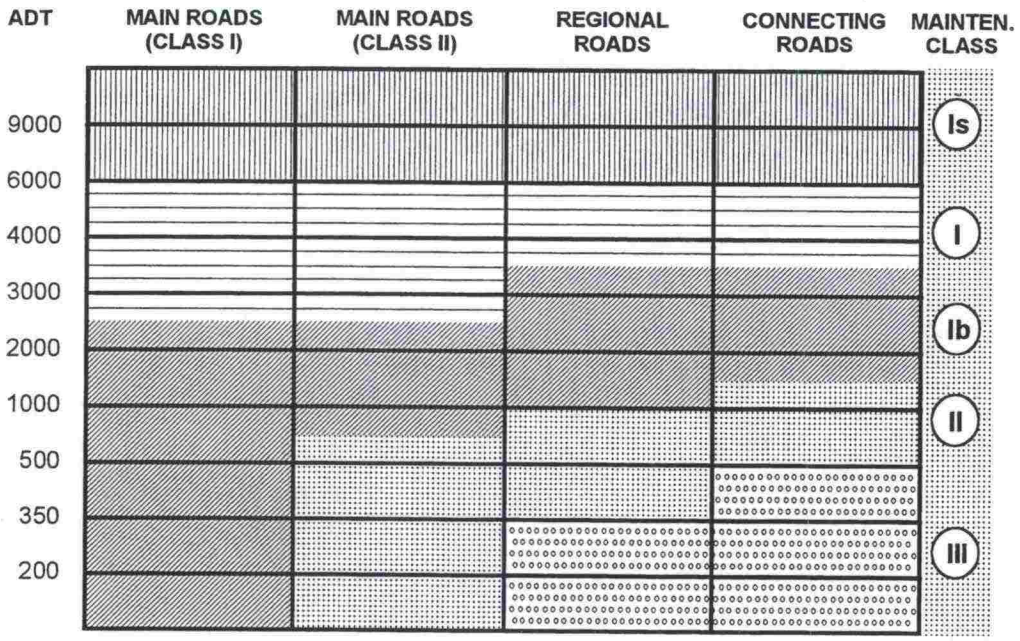


Figure 1. Winter maintenance classification of the road network.

The goals for the levels of service of winter maintenance classes and the quality standards that serve as guidelines depict the level required in normal conditions, which may not be achieved during periods of continuously changing weather and cycle times. If the weather allows a road to be kept in

better condition than required by the standard (for example, Ib roads kept bare in the coastal area), it should be done so.

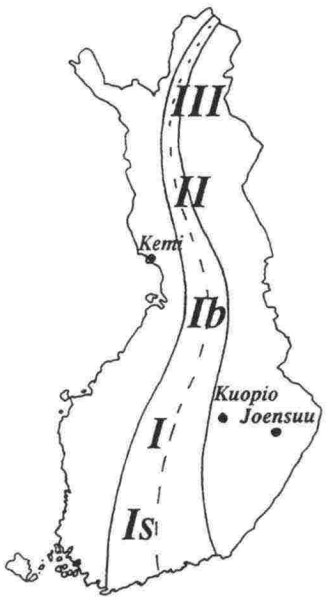
A centralized maintenance class decision will be made for class I main roads based on the district-level plans.

6.2 Winter maintenance classes

The following general descriptions depict driving conditions in normal winter conditions. The quality level may not meet the objective within the cycle time in abnormal situations, such as during or immediately after snowstorms. A more detailed description is given in paragraph 7.1.

Winter maintenance class Is

The roads will be kept in such condition that snow and ice will not affect traffic fluency or safety. The roads will be kept bare all winter, requiring the use of salt. During long periods of freezing weather, when it is not possible to use salt, the surface of the road may contain intermittent ice. The objective will be to prevent slipperiness beforehand, because this will make it possible to attain good cost efficiency due to the large volume of traffic on this road network.



Winter maintenance class I

The roads will be kept bare except during the middle of the night. There may be a thin layer of compacted snow with gently sloping edges between the lanes and at the edge of the road, but at least one half of the road's surface in the cross direction must be bare. Problems of slipperiness will be eliminated by means of anticipative skid prevention measures.

Winter maintenance class Ib

In autumn and spring the roads will be kept free of ice and snow. In the middle of winter the surface of the road may contain a uniform layer of ice or snow that provides sufficient traction, a well cared for surface of compacted snow. The compacted snow will be graded to make it thin, so that when bare pavement begins to show, the ruts will be shallow and wide. The surface of compacted snow will be preserved if it provides sufficiently good driving conditions. Conditions will differ between inland and coastal areas.

Winter maintenance class II

A road network with a surface of sufficiently well cared for compacted snow. Traveling in winter conditions, without unexpected situations. The surface of the roads will contain a layer of compacted snow which will be sanded in difficult road conditions. Special areas like steep hills usually will be sanded.

Winter maintenance class III

The road network will contain mainly satisfactory driving conditions. Maintenance measures will be adapted to the geometry of the road, so the level of service may vary from place to place. Skid prevention measures will be implemented only in the most problematic road conditions.

6.3 Pedestrian and bicycle paths

The level of service of pedestrian and bicycle paths is proportional to the volume of traffic and traffic needs. The most important factors are commuter and school traffic and mass transportation service, as well as the needs of bicycle traffic. The paths are divided into two classes, K1 and K2.

- **K1:** Paths in and around built-up areas that carry a large volume of commuter and school traffic and function as connecting routes to mass transportation. The high level of service of the paths makes regular, safe bicycling possible. The paths are maintained before the flow of traffic begins.

- **K2:** Paths that carry a small volume of irregular daily traffic. The paths have a satisfactory level of service that mainly serves pedestrians.

7 QUALITY STANDARDS

7.1 Quality standards of winter maintenance classes

The quality of winter maintenance is defined by means of the following factors:

- the quality of the surface of the road in stable conditions
  - friction and its temperature threshold
  - evenness
  - period of validity of the standards (day/night)
- the quality of the surface of the road during a snowfall
  - maximum thickness of the snow layer
- reaction time after a change in weather/road conditions
  - cycle time (skid prevention, snow removal, grading).

The quality standards are mainly concerned with the part of the road that affects travel. The quality standards of the other parts of the road (junctions, shoulders, bus stops, separate areas) are presented in conjuction with the operational instructions in the Winter Maintenance Methods Manual.

The quality standards **in normal winter conditions** are presented in Table 1.

Table 1. Quality standards in normal winter conditions.

Winter Maintenance Class	Friction	Evenness (mm)	Temperature Threshold (°C)	Period of Validity[1] (time)
Is	0.3	-	-6	always
I	0.3	10	-4	5 - 22
Ib	0.25	20	-	5 - 22
II	rough, compacted snow	30	-	6 - 22
III	rough, compacted snow	30	-	6 - 22
[1] unless local traffic needs require otherwise				

- In order to meet the friction standard, at least one half of the lane must meet the requirement. The friction scale is linked to the driving condition description presented in the Winter Maintenance Methods Manual.
- The temperature threshold (at the surface of the road) is applied in practice by taking into account the expected temperature development.
- The period of validity is at least as long as the time shown in the table, unless local traffic needs require otherwise.
- The friction standard of classes Is and I is 0.25 when the temperature is below the threshold level.
- The friction standard in class Ib is valid at all temperatures. In practice, this means the surface of the road must be kept at least partly bare during periods of warm weather.
- No precise friction standard is given for classes II and III, but enough friction is required to meet the needs of traffic.
- Skid prevention in class II is regularly implemented in problem areas, and everywhere when particularly difficult road conditions prevail. Skid prevention is facilitated by grading the layer of compacted snow.
- Sanding is usually carried out in class III only when particularly difficult road conditions prevail.
- No limits are given for the amount of snow allowed, loose snow must be removed within the cycle time after the snowfall has stopped.
- The evenness standard for classes I + Ib requires that ruts do not have steep edges. In the other classes, the edge must not be more than 10 mm high. Rut depth must not exceed 40 mm during the cycle time, even in class III.
- Outside the period of validity, the next lower maintenance class is valid, making sure in class III that road usage is not obstructed (the minimum requirement by law).
- The quality of passing lanes and exit ramps must be the same as for the actual traffic lanes, to prevent unexpected situations. However, it is not

always possible to eliminate slipperiness due to a small volume of traffic, for example.

In changing weather conditions, which cause changes in road conditions, the cycle times and the amount of snow allowed in the lanes during snowfall are shown in Table 2.

Table 2. Quality standards of winter maintenance in changing weather conditions.

Winter Maintenance Class	Max. Snow Depth (loose snow/slush) (cm)	Cycle Time		
		Snow/Slush Removal (hr)	Skid Prevention (hr)	Surface Evenness (day)
Is	4/2	2.5	2	1
I	4/2	3	2	1
Ib	4/2	3	3 (salt) 4 (sand)	1
II	8	4	6	3
III	10	6	12	5

- Skid prevention cycle time refers to the time expired from the moment the quality level has gone below the limit to the moment the operation has been completed. For snow removal, it means the time expired from the moment the snowfall has stopped to the time the snow removal operation has been completed.
- Anticipative skid prevention during conditions of black ice is implemented on the busiest roads without cycle time.
- Maximum snow depth refers to normal snowfalls. In abnormal snowstorms the values may be exceeded.
- Snow depth refers to the predominant situation in the traffic lanes, including snow piled up by traffic, but not including intermittently drifted snow.
- Intermittently drifted snow must be removed within the cycle time so that it does not obstruct traffic.

7.2 Quality standards of pedestrian and bicycle paths

The main requirements of pedestrian and bicycle path maintenance are:
- correctly timed maintenance to prevent light traffic from using the roadway.
- enough friction to ensure safe travel.
- snow does not obstruct the use of bicycles and strollers.

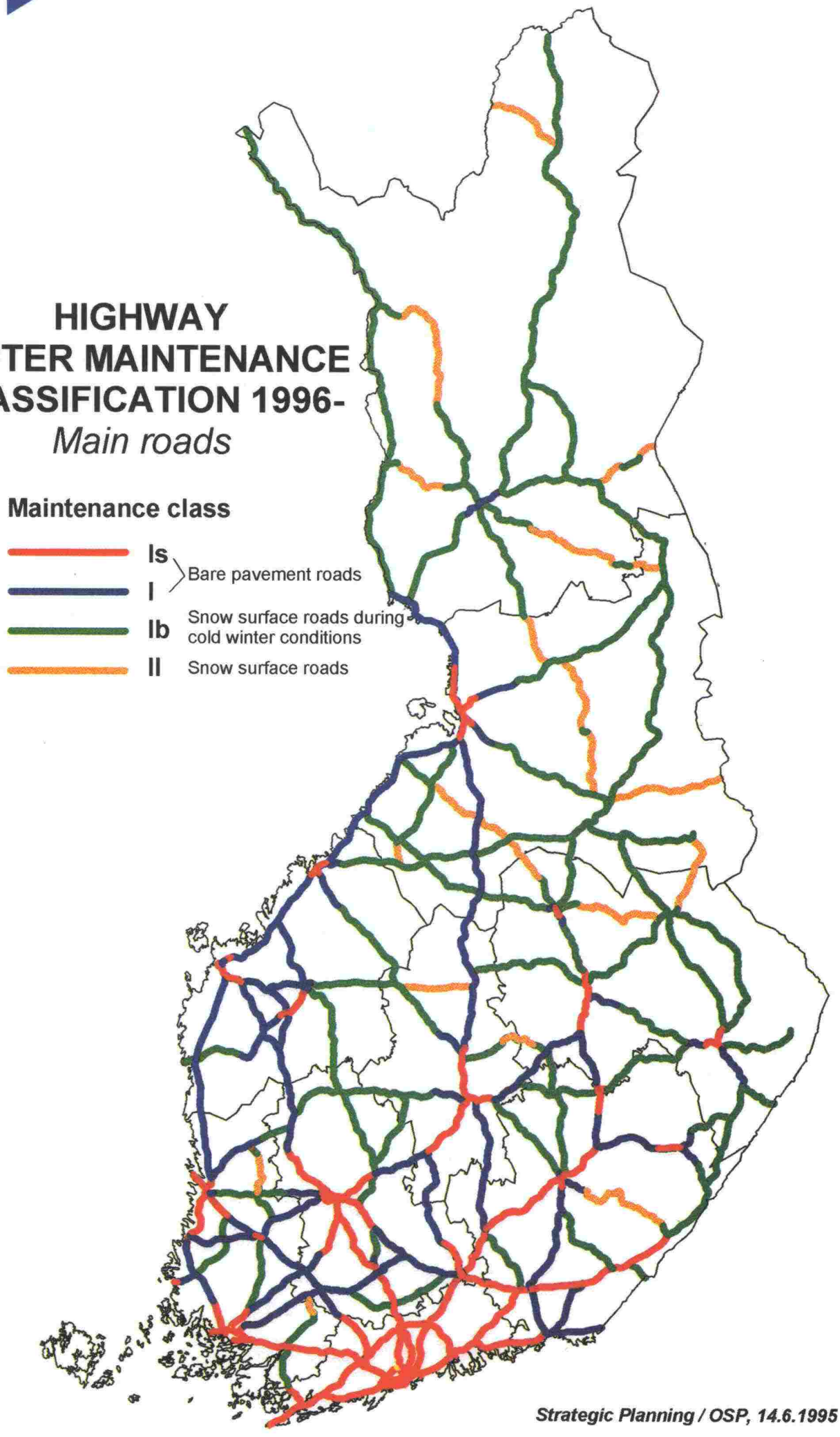
Table 3. Quality standards of pedestrian and bicycle paths.

Maintenance Class	Quality Standards
K1	* Maintained before traffic flow begins * Paths next to main roads cleared immediately after main roads * Maximum depth of loose snow during snowfall is 3 cm * Enough friction to allow safe bicycling and walking * Cycle time 2/4 hr (skid prevention/snow removal)
K2	* Paths maintained after busy paths have been maintained * Maximum depth of loose snow during snowfall is 4 cm * Cycle time 4/6 hr (skid prevention/snow removal)

- The quality standards are valid between the hours of 6 - 22 unless local traffic requires otherwise.
- An unsanded area must be left near the edge of wide paths that daily carry kicksled and toboggan traffic.
- The compacted snow surface of pedestrian and bicycle path that is immediately adjacent to the roadway must be kept level to prevent the light traffic from drifting onto the roadway.
- The paths are to be graded to level them and also roughen the surface, while taking care not to create grooves that hinder bicycling or compact and polish the surface.
- In the spring, slush is to be removed to facilitate bicycling.

HIGHWAY WINTER MAINTENANCE CLASSIFICATION 1996-

Main roads

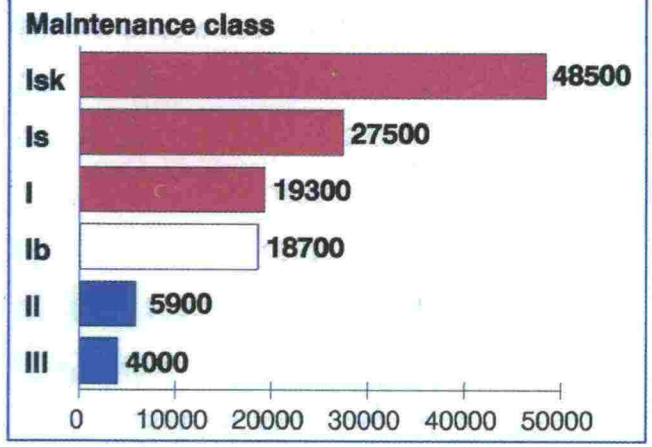


Strategic Planning / OSP, 14.6.1995

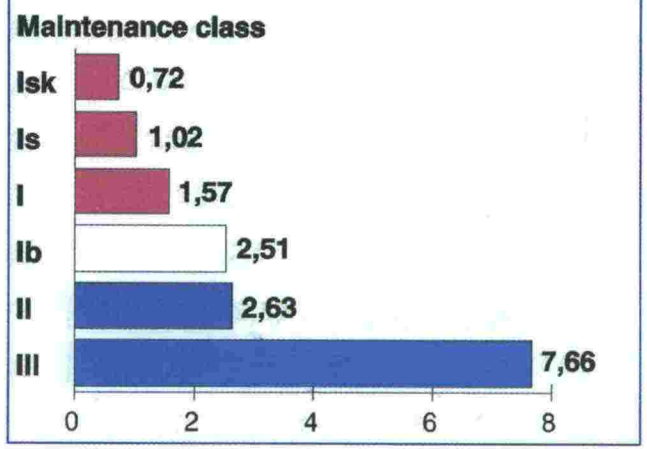
WINTER MAINTENANCE MANAGEMENT

COSTS BY MAINTENANCE CLASS (1994)

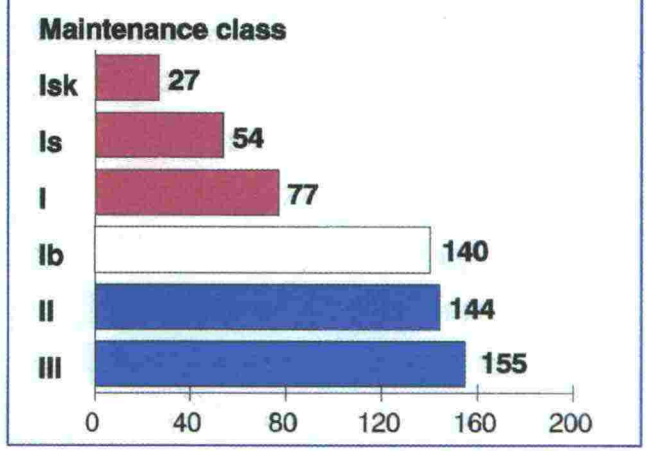
FIM / KM



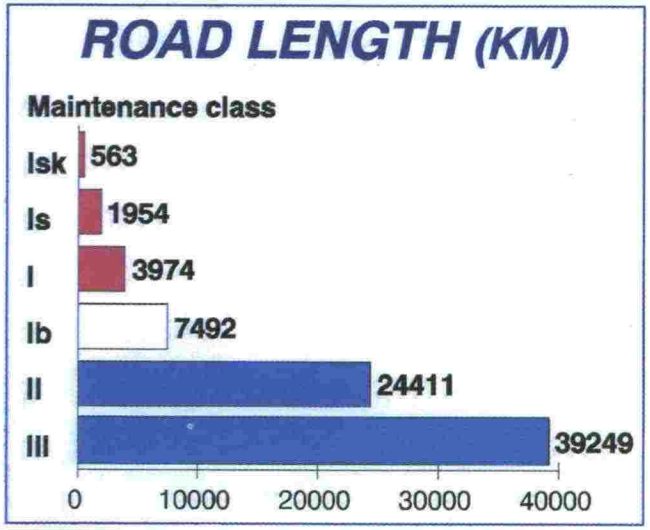
P / AUTO KM



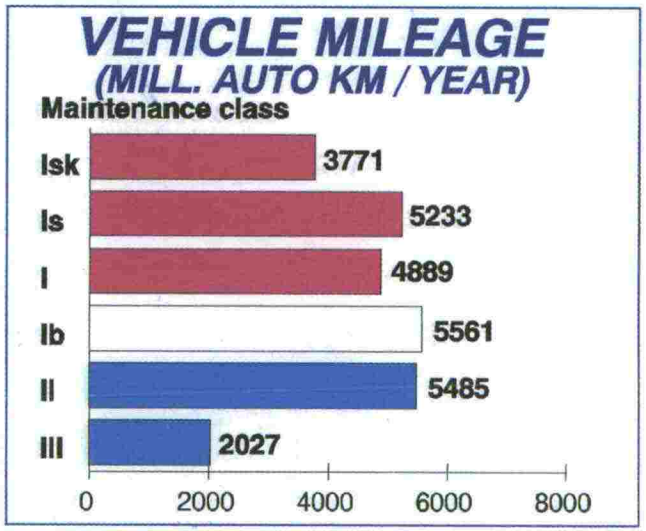
TOTAL COSTS (FIM)



ROAD LENGTH (KM)



VEHICLE MILEAGE (MILL. AUTO KM / YEAR)



POLICY 90 - 95

Isk (divided)
Is

POLICY 96-

Is

COSTS INCLUDING GENERAL COSTS

APPENDIX

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